

We claim:

1. A method for inhibiting the formation of clathrate hydrates in a fluid having hydrate-forming constituents, the method comprising contacting the fluid with an effective amount of inhibitor wherein the inhibitor comprises a substantially water-soluble polymer having a bimodal molecular weight distribution, wherein the polymer is a blend of a high-molecular weight component and a low-molecular weight component of the same polymer, the polymer includes a maleimide, the polymer includes an ester of N-acyldehydroalanine, the polymer includes an amide of N-acyldehydroalanine, the polymer is polymerized as a bimodal polymer, or combinations thereof.
2. The method of claim 1 wherein the polymer is a blend of a high-molecular weight component and a low-molecular weight component.
3. The method of claim 1 wherein the polymer is a blend of a high-molecular weight component and a low-molecular weight component of the same polymer.
4. The method of claim 1 wherein the polymer is polymerized as a bimodal polymer.
5. The method of claim 1 wherein the ratio of low molecular weight polymer component to high molecular weight polymer component is from 20:1 to 1:1.
6. The method of claim 5 wherein the ratio of low molecular weight polymer component to high molecular weight polymer component is from about 15:1 to about 1:1.
7. The method of claim 1 wherein the polymer is mixed with a carrier solvent prior to treating the fluid, and wherein the carrier solvent is selected from the group consisting of water, brine, sea water, produced water, methanol, ethanol, propanol, isopropanol, glycol, and mixtures thereof.

8. The method of claim 1 wherein the inhibitor is provided in an aqueous solution, and the fluid is a petroleum fluid.

9. The method of claim 1 wherein the inhibitor is present in the fluid at a concentration of from 0.01 wt% to 0.5 wt% of the water present in the fluid.

10. The method of claim 1 wherein the polymer comprises a plurality of one or more mer-units selected from the group consisting of N-vinyl amides, N-allyl amides, acrylamides, methacrylamides, N-vinyl lactams, maleimides, vinyl oxazolines, esters of N-acyldehydroalanine, or amides of N-acyldehydroalanine.

11. The method of claim 1 wherein the polymer is an N-vinyl amide homopolymer, an acrylamide homopolymer, a methacrylamide homopolymer, or an N-vinyl lactam homopolymer.

12. The method of claim 1 wherein the polymer is an N-vinyl caprolactam.

13. The method of claim 12 wherein the N-vinyl caprolactam polymer contains 60 mass % to 95 mass % low molecular weight polymer with a weight average molecular weight of between 500 and 10,000, and 5 mass % to 40 mass % of high molecular weight polymer having a weight average molecular weight of between 10,000 and 6,000,000, and the bimodal polymer exhibits a minimum point on its molecular weight mass distribution curve between 5,000 and 100,000 weight average molecular weight.

14. The method of claim 13 wherein the ratio of low molecular weight polymer component to high molecular weight polymer component is from about 12:1 to about 6:1.

15. The method of claim 1 wherein the polymer is an N-isopropyl methacrylamide.

16. The method of claim 15 wherein the N-isopropyl methacrylamide polymer contains 75 mass % to 95 mass % low molecular weight polymer with a

weight average molecular weight of between 500 and 10,000, and 5 mass % to 25 mass % of high molecular weight polymer having a weight average molecular weight of between 10,000 and 6,000,000, and the bimodal polymer exhibits a minimum point on its molecular weight mass distribution curve between 5,000 and 100,000 weight average molecular weight.

17. The method of claim 16 wherein the ratio of low molecular weight polymer component to high molecular weight polymer component is from about 12:1 to about 6:1.

18. The method of claim 1 wherein said polymer exhibits two or more minimum points between three or more peaks on said polymer's molecular weight distribution curve.

19. The method of claim 18 wherein said polymer exhibits only a single minimum point between only two peaks on said polymer's molecular weight distribution curve.

20. The method of claim 18 wherein said polymer exhibits two minimum points between three peaks on said polymer's molecular weight distribution curve.

21. A method for inhibiting the formation of clathrate hydrates in a fluid having hydrate-forming constituents, the method comprising contacting the fluid with an effective amount of a polymer blend of a low molecular weight polymer component and a high molecular weight polymer component, wherein the high-molecular weight component and the low-molecular weight component are of the same polymer, the blend has a bimodal molecular weight distribution, the low molecular weight polymer component contains polymer having a weight average molecular weight of between 500 and 10,000, the high molecular weight polymer component contains polymer having a weight average molecular weight of between 10,000 and 6,000,000, and the ratio of low molecular weight component to high molecular weight component is from 20:1 to 1:1.

22. A method for preparing a hydrate inhibitor by blending a high molecular weight polymer component with a low molecular weight polymer component, wherein the high-molecular weight component and the low-molecular weight component are of the same polymer.

23. The method of claim 22 wherein the low molecular weight polymer component contains polymer having a weight average molecular weight of between 500 and 10,000, the high molecular weight polymer component contains polymer having a weight average molecular weight of between 10,000 and 6,000,000, and the ratio of low molecular weight polymer component to high molecular weight polymer component is from 20:1 to 1:1.

24. A method for preparing a polymeric hydrate inhibitor by blending a high molecular weight polymer component with a low molecular weight polymer component, wherein the polymeric hydrate inhibitor includes a maleimide, an ester of N-acyldehydroalanine, or an amide of N-acyldehydroalanine.

25. A method for inhibiting the formation of clathrate hydrates in a fluid having hydrate-forming constituents, the method comprising contacting the fluid with an effective amount of a polymer blend of a low molecular weight polymer component and a high molecular weight polymer component, wherein the polymer blend includes a maleimide, an ester of N-acyldehydroalanine, or an amide of N-acyldehydroalanine, the blend has a bimodal molecular weight distribution, the low molecular weight polymer component contains polymer having a weight average molecular weight of between 500 and 10,000, the high molecular weight polymer component contains polymer having a weight average molecular weight of between 10,000 and 6,000,000, and the ratio of low molecular weight component to high molecular weight component is from 20:1 to 1:1.